

Exhibit

Waterblasting – 2015

Flow Velocity Calculations

From H₂O Flow Rate chart - Ref. (5b)

P: 40,000 y.

Orifice size: $\phi.016''$

Q: 1.068 GPM

$$A = \frac{\pi d^2}{4} = \frac{\pi (0.016'')^2}{4} = 0.000200 \text{ in}^2$$

$$V = \frac{Q}{A} = \frac{(1.068 \text{ gal}) \left(\frac{231 \text{ in}^3}{\text{gal}} \right) \left(\frac{\text{min}}{60 \text{ sec}} \right) \left(\frac{1}{0.0002 \text{ in}^2} \right) \left(\frac{1 \text{ ft}}{12''} \right)}{1} =$$

$$= \left(4.11 \frac{\text{in}^3}{\text{sec}} \right) \left(\frac{1}{0.0002 \text{ in}^2} \right) \left(\frac{1 \text{ ft}}{12''} \right) = \underline{\underline{1,713 \text{ ft/sec}}}$$

$$\text{Mach No.} = \frac{1,713 \text{ ft/sec}}{1,125 \text{ ft/sec}} = \underline{\underline{1.52}}$$

$$\underline{\underline{\text{MPH}}} = \frac{(1,713 \text{ ft/sec}) \left(\frac{60 \text{ mph}}{88 \text{ ft/sec}} \right)}{1} = \underline{\underline{1,168 \text{ mph}}}$$

% of Pistol Round - 357 Magnum 127%
Muzzle Vel. - 44 Magnum 110%

Flow Velocity Calculations

Muzzle Velocities - from Ref (5d)

	<u>Bullet Grains</u>	<u>Pistol</u>	<u>Rifle</u>
.357 Magnum	140	1,350	1,850
	125	(1,500)	
.44 Magnum Remington	225		1,870
	180	1,550	
	200	1,500	

Water Flow Rate (GPM/LPM)
a Function of Pressure (PSI/BAR) and Orifice Size (Inch/mm)

Pressure	Orifice Size (Inch/mm)																				
	.003 .076	.004 .100	.005 .127	.006 .152	.007 .178	.008 .203	.009 .229	.010 .254	.011 .279	.012 .305	.013 .330	.014 .356	.015 .381	.016 .406	.017 .432	.018 .457	.019 .483	.020 .508	.021 .533	.022 .559	.023 .584
20,000 1379	.026 .098	.047 .18	.074 .28	.106 .40	.145 .55	.189 .71	.239 .90	.295 1.12	.357 1.351	.425 1.608	.499 1.888	.578 2.187	.664 2.51	.755 2.86	.853 3.23	.956 3.62	1.065 4.03	1.180 4.47	1.301 4.92	1.428 5.40	1.561 5.91
25,000 1724	.029 .110	.053 .20	.082 .31	.119 .45	.162 .61	.211 .80	.267 1.01	.330 1.25	.399 1.51	.475 1.80	.557 2.11	.646 2.44	.742 2.81	.844 3.19	.953 3.61	1.069 4.05	1.191 4.51	1.319 4.99	1.455 5.51	1.596 6.04	1.745 6.60
30,000 2069	.032 .121	.058 .22	.090 .34	.130 .49	.177 .67	.231 .87	.293 1.11	.361 1.36	.437 1.65	.520 1.97	.611 2.31	.708 2.68	.813 3.08	.925 3.50	1.044 3.95	1.171 4.43	1.304 4.94	1.445 5.47	1.573 5.95	1.749 6.62	1.911 7.23
35,000 2414	.035 .132	.062 .23	.098 .37	.140 .59	.191 .72	.250 .95	.316 1.20	.390 1.48	.472 1.79	.562 2.13	.660 2.50	.765 2.90	.878 3.32	.999 3.78	1.128 4.27	1.264 4.78	1.409 5.33	1.561 5.91	1.721 6.51	1.889 7.15	2.064 7.81
40,000 2759	.037 .140	.067 .25	.104 .39	.150 .57	.204 .77	.267 1.01	.338 1.28	.417 1.58	.505 1.91	.601 2.27	.705 2.67	.818 3.10	.939 3.55	1.068 4.04	1.206 4.56	1.352 5.12	1.506 5.70	1.669 6.32	1.840 6.96	2.019 7.64	2.207 8.35
45,000 3103	.039 .148	.071 .27	.111 .42	.159 .60	.217 .82	.283 1.07	.358 1.35	.443 1.68	.535 2.02	.637 2.41	.748 2.83	.867 3.28	.996 3.77	1.133 4.29	1.279 4.84	1.434 5.43	1.597 6.04	1.70 6.70	1.951 7.38	2.142 8.11	2.341 8.86
50,000 3448	.042 .159	.075 .28	.117 .44	.168 .63	.229 .87	.299 1.13	.378 1.43	.466 1.76	.564 2.13	.672 2.54	.788 2.98	.914 3.46	1.049 3.97	1.194 4.52	1.348 5.10	1.511 5.72	1.684 6.37	1.866 7.06	2.057 7.79	2.258 8.55	2.467 9.34
55,000 3793	.044 .167	.078 .295	.122 .46	.176 .67	.240 .91	.313 1.18	.396 1.49	.489 1.85	.592 2.24	.704 2.66	.827 3.13	.959 3.63	1.101 4.17	1.252 4.74	1.414 5.35	1.585 5.99	1.766 6.68	1.957 7.41	2.157 8.16	2.368 8.96	2.588 9.80